Lösung – Analysis – Gruppe A

1. $f(x) = 10 \cdot \dfrac{\ln(x^2+4)}{x^2+4}$, $D_f = \mathbb{R}$

1.1 (5)

- $f(-x) = 10 \cdot \dfrac{\ln(x^2+4)}{x^2+4} = f(x) \Rightarrow$ achsensym.
- $f(x) = 0 \Rightarrow \ln(x^2+4) = 0 \Rightarrow x^2+4 = 1$

$$\Rightarrow x^2 = -3 \; ↯$$

1.2 (4)

$$\lim_{x \to +\infty} 10 \cdot \frac{\overbrace{\ln(x^2+4)}^{\nearrow \infty}}{\underbrace{x^2+4}_{\searrow \infty}} = 0, \text{ da "ln unterliegt"}$$

$\lim_{x \to -\infty} f(x) = 0$ (da sym.)

hor. Asy.: $y = 0$

1.3 (10)

$$f'(x) = 10 \cdot \frac{\frac{2x}{x^2+4} \cdot (x^2+4) - 2x \cdot \ln(x^2+4)}{(x^2+4)^2} =$$

$$= 10 \cdot \frac{2x - 2x \cdot \ln(x^2+4)}{(x^2+4)^2} =$$

$$= 10 \cdot \frac{2x \cdot (1 - \ln(x^2+4))}{(x^2+4)^2} = 0$$

$\Rightarrow 2x \cdot (1 - \ln(x^2+4)) = 0 \Rightarrow \underline{x = 0}$

oder $1 - \ln(x^2+4) = 0 \Rightarrow \ln(x^2+4) = 1$

$\Rightarrow x^2+4 = e \Rightarrow x^2 = e - 4 < 0 \; ↯$

Mon.bev.	$-\infty < x <$	0	$< x < \infty$
f'	+		−
G_f	steigt	HP	fällt

(oder Begründung mit Grenzverhalten

$f(0) = 10 \cdot \dfrac{\ln 4}{4} \approx 3{,}47 \Rightarrow \underline{\underline{HP(0;\, 3{,}47)}}$

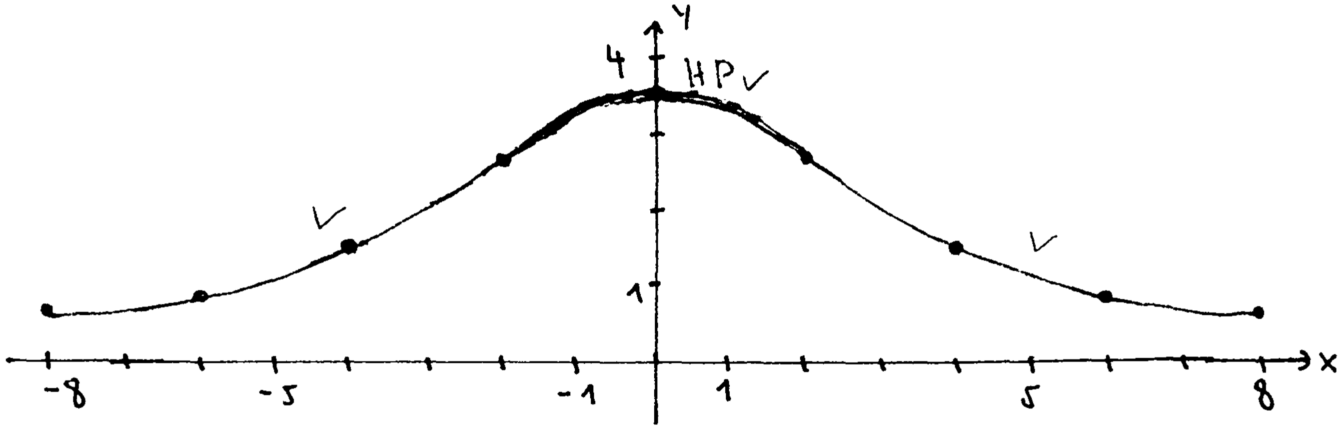
1.4 $f(2) \approx 2{,}60$

5

$f(4) \approx 1{,}50$

$f(6) \approx 0{,}92$

$f(8) \approx 0{,}62$



2. $g(x) = 2x - 4 - \dfrac{6}{3x-1}$

4

$G(x) = x^2 - 4x - \dfrac{6}{3} \cdot \ln|3x - 1| =$

$= x^2 - 4x - 2 \cdot \ln|3x-1|$